40749

S/120/62/000/004/017/047
E192/E382

24.6730

AUTHORS: Vodop'yanov, F.A., Zlatov, Yu.M., Uvarov, V.A., Barabash, L.Z. and Lebedev, P.I.

TITLE: Investigation of the precision system of programmed frequency-control of the accelerating field in the proton synchrotron.

PERIODICAL: Pribory i tekhnika eksperimenta, no. 4, 1962, 98 - 101

TEXT: The programmed frequency control in the proton synchrotron is based on two precision elements: a frequency programmer and a driver oscillator (described on pp. 80 and 89 of this issue). During development of this equipment the following problems were investigated: 1) accuracy and stability of the functional relationship of the frequency and the magnetic field in the gaps of the electromagnet; 2) parasitic micro-modulation of the accelerating field and 3) influence of the characteristics of the accelerating field on the process of particle acceleration. The stability was measured at 9 points of the operating-frequency range (between 696 kc/s and 8.295 Mc/s)
Card 1/3 REFERENCE S/120/62/000/004/025/047

Investigation of ....

and it was found that the short-term instability at the lowest frequency was $\pm$ 3 x 10^{-4} and $\pm$ 0.06 x 10^{-4} at the upper limit frequency; corresponding figures for long-term instability are $\pm$4.5 x 10^{-4} and $\pm$0.06 x 10^{-4}. The permissible instability for the two limits is $\pm$ 10 x 10^{-4} and 0.8 $\pm$ 10^{-4}. The parasitic micro-modulation due to noise was measured at 15 fixed frequencies and it was found that this never exceeded the prescribed tolerance. The modulation due to combination frequencies was largely reduced by using a balanced-mixer system. Losses in the proton beam as a function of the accuracy of the frequency-change law were investigated during the starting of the accelerator. For this purpose the frequency-programmer of the system received an additional voltage pulse having the gaussian shape and a duration of 50 - 160 μs. Introduction of such perturbations at magnetic fields of 650, 4 000 and 6 000 Oe produced an additional radial deflection of the beam of $\pm$ 2.5, $\pm$ 3.0 and $\pm$ 1 mm, at which the strength of the beam was halved; the frequency changes corresponding to these deflections were $\pm$ 1.3 x 10^{-3}, $\pm$ 10^{-4} and $\pm$ 1.5 x 10^{-5}.

Investigation of S/120/62/000/004/017/047
E192/E382

ASSOCIATION: Radiotekhnicheskiy institut GKAE
(Radio-engineering Institute, GKAE)

SUBMITTED: April 5, 1962

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VODOP'YANOV, F.A.

Master oscillator in the precision system of programmed control of the frequency of the accelerating field in a proton synchrotron. Prib. i tekh. eksp. 7 no.4:80-84 Jl-Ag '62. (MIRA 16:4)

1. Radiotekhnicheskiy institut Gosudarstvennogo komiteta po ispol'zovaniyu atomnoy energii SSSR.
(Oscillators, Electric) (Automatic control)
(Synchrotron)

VODOP'YANOV, F. A.

24688

S/120/62/000/004/047/047
E039/E420

AUTHORS: Vladimirskiy, V.V., Gol'din, L.L., Pligin, Yu.S., Veselov, M.A., Talyzin, A.N., Tarasov, Ye.K., Koshkarev, D.G., Lapitskiy, Yu.Ya., Barabash, L.Z. Kleopov, I.F., Lebedev, P.I., Kuz'min, A.A., Batalin, V.A., Onosovskiy, K.K., Uvarov, V.A., Vodop'yanov, F.A.

TITLE: Adjustment of the acceleration regime of the 7 Gev proton synchrotron

PERIODICAL: Pribory i tekhnika eksperimenta, no.4, 1962, 248-255

TEXT: In order to establish the optimum parameters for programming the control frequency the intensity, position, and frequency and amplitude of transverse oscillation of the beam is measured in three stages: (1) during the first revolution, (2) with a circulating beam and (3) with acceleration. For measurements on the first revolution long afterglow scintillation screens are used which are either observed visually or by means of a television camera. The screens are placed in the sections between magnet blocks; 15 in the initial part and 10 in the final part of the chamber. It is shown that the orbit does not

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Adjustment of the acceleration ...

deviate by more than 1.5 cm from the axis during the first revolution. Circulating beams without acceleration are obtained which continue for 20 to 30 revs. The circulating current is determined by means of a flight tube and the transverse oscillation frequency with an electrostatic probe with double vertical and horizontal plates. Scintillation screens in the form of a grid with 85% transmission are used to show the beam position and diameter for 5 to 10 revs. The beam diameter is shown to be about 4 cm under normal conditions. Investigations are carried out on the optimum form of the frequency - time relation for holding the beam in orbit. The width of the trapping region is $\pm$ 3 Kc/s for an initial frequency of 750 Kc/s which agrees well with theoretical estimates. Preliminary adjustment permitted the attainment of 6.2 Gev protons and after adjustment 7.2 Gev protons were obtained on October 25, 1961. The usual intensity on a normal cycle lies in the range 3 to 5 x 10^9.
There are 7 figures and 1 table.

ASSOCIATION: Institut teoreticheskoy i eksperimental'noy fiziki GKAE (Institute of Theoretical and Experimental Physics GKAE)

SUBMITTED: April 11, 1962
Card 2/2

VODOP'YANOV, F.A.

S/089/62/012/006/003/019
B102/B104

24 6730

AUTHORS: Vladimirskiy, V. V., Komar, Ye. G., Mints, A. L., Gol'din, L. L., Monoszon, N. A., Rubchinskiy, S. M., Tarasov, Ye. K., Vasil'yev, A. A., Vodop'yanov, F. A., Koshkarev, D. G., Kuryshev, V. S., Malyshev, I. F., Stolov, A. M., Strel'tsov, N. S., Yakovlev, B. M.

TITLE: The design of the 7-Bev proton synchrotron

PERIODICAL: Atomnaya energiya, v. 12, no. 6, 1962, 472-474

TEXT: The history of the first Soviet cyclic accelerator with rigid focusing is briefly described, and the most important data on its planning and operation are presented. Planning was started in 1953. The parameters of this proton accelerator, the energy of which exceeds the antinucleon production threshold, were so chosen that the dependence of the orbital circumference on the particle momenta was completely compensated. This was achieved by employing 14 quadrupole magnets with orbits of negative curvature. Technical data: output current, 10^{10} protons/pulse; maximum field strength, 8475 oe; length of equilibrium orbit, 251.2 m; radius of

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The design of the 7-Bev ... S/089/62/012/006/003/019
B102/B104

curvature of the trajectories in the bending magnets (C), 31 m, and in the compensation magnets (X), ∞; number of magnetic sectors, 98C + 14X; gap length between the C-magnets, 304.0 mm; gap length around the X-magnets, 417.5 mm; index of the decrease in field strength, 460; internal height and width of the chamber, 80 and 110 mm, respectively; number of betatron oscillations per revolution, 12.75, and per periodic element, 0.91; number of magnets per periodic element, 8; total critical energy, 19.2 Bev; maximum deviation of the periodic orbit with 100% deviation of the momentum from the equilibrium momentum, 1.47 m; rate of energy increase per revolution, 4.3 kev; duration of one cycle, 1.55 sec; 10-12 cycles/min; particle revolution frequency at the beginning of the cycle, 0.11 Mc/sec, and at the end, 1.19 Mc/sec; frequency of synchrocyclotron oscillations, 3600 and 130 cps; weight of the electromagnet steel, 2500 tons; maximum power of the supply system, 25 Mw; Van de Graaff injector (particle energy, 3.8 Mev; field strength 90 oe); admissible deviations from field strength and field gradients, $\sim 10^{-3}$; deviations at the chamber edge due to nonlinearities, $\sim 10^{-2}$; admissible frequency deviation of the accelerating field at the beginning of the cycle, 10^{-3}, and at the end, $5 \cdot 10^{-5}$. There are 1 figure and 1 table.

SUBMITTED: March 12, 1962
Card 2/2

Vodop'yanov, F. A.

18

L 43088-65 EWT(m)/ EPA(w)-2/EWA(m)-2 Pab-10/Pt-7 IJP(c) JT/GS

ACCESSION NR: AT5007918 S/0000/64/000/000/0197/0201

58
54
B

AUTHOR: Vladimirskiy, V. V.; Gol'din, L. L.; Koshkarev, D. G.; Tarasov, Ye. K.; Yakovlev, B. N.; Gustov, G. K.; Komar, Ye. G.; Kulikov, V. V.; Malyshev, I. F.; Monosson, N. A.; Popkovich, A. V.; Stolov, A. M.; Strel'tsov, N. S.; Titov, V. A.; Vodop'yanov, F. A.; Kuz'min, A. A.; Kuz'min, V. F.; Hints, A. L.; Ruhchinskiy, S. M.; Uvarov, V. A.; Zhadanov, V. M.; Filaretov, S. G.; Shiryayev, F. Z.

TITLE: 60-70 Gev Proton Synchrotron 19

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963. Trudy. Moscow, Atomizdat, 1964, 197-201

TOPIC TAGS: high energy accelerator, synchrotron

ABSTRACT: A 60-70 Gev proton synchrotron with strong focusing is being constructed not far from Serpukhov, as has been reported earlier (e.g. "Research Institute for Electro-Physical Equipment, Leningrad," in Proceedings of the International Conference on High Energy Accelerators and Instrumentation (CERN, 1959), p. 373). The present report describes parameter changes and improvements in precision structural characteristics of the accelerator, and the present state of construction in mid-1963. The parameters of the magnet are presented in a table. A small change in the original plans permitted an increase in the length of a part of the free

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L 43038-65

ACCESSION NR: AT5007918

sections, some of which are utilized for input and exit of beams. The super-period design is described. The lengthened sections were obtained as a consequence of shortening the focusing and defocusing blocks by 112 cm. The focusing properties of the magnetic channel were diminished consequently, but very little; and the limiting energy was lowered by 2-3 Gev. The construction of the magnet is described. Each of the magnetic blocks is divided lengthwise into 5 sub-blocks which are enveloped by the common winding. These sub-blocks consist of laminar two-millimeter silicon steel. These steel sheets were stamped out without subsequent mechanical working, and were subjected to sorting and intermixing in order to smooth out their magnetic characteristics. The sub-blocks are constricted by lateral welded plates without adhesion. Provision was made for windings on the poles in order to correct for pole nonlinearity and for variations in the drop reading. These windings make it possible to introduce artificial quadratic (square) nonlinearity that changes the dependence of the frequency of transverse oscillations during a pulse. In order to correct for straying of the residual field, provision has been made for windings on the yoke in series with the main winding. The sub-blocks must undergo calibration on a magnet stand in order to make correcting systems more precise and to determine the most convenient disposition of the sub-blocks along the ring. The winding of the electromagnet is made of aluminum busbars with hollow cores for cooling water. The length of the busbar is so selected that there would be no

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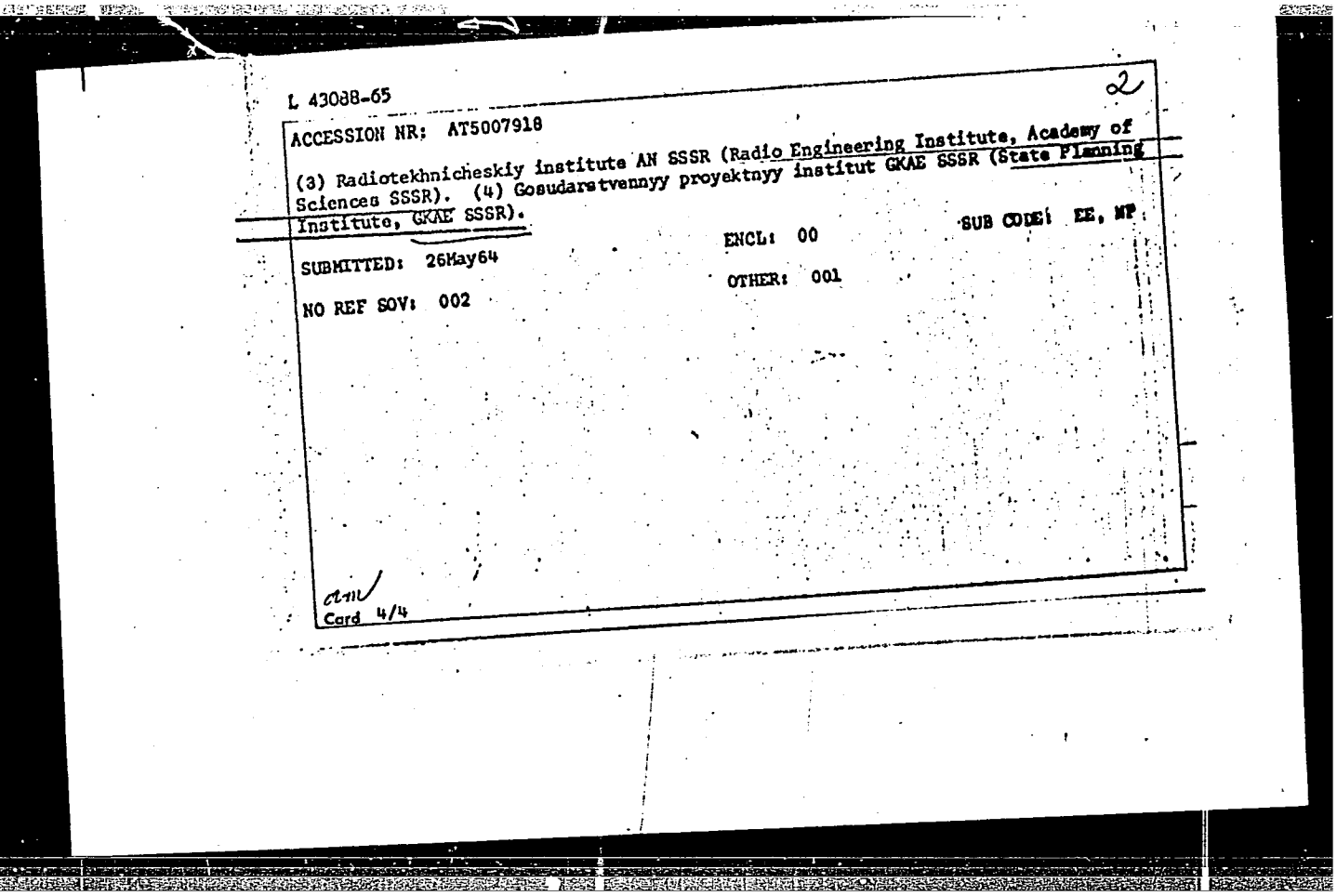
L 43008-65 -2

ACCESSION NR: AT5007918

welded joints inside the coils. The winding consists of 4 sections, two of which are disposed on the upper pole and two on the lower. The most important characteristics of the electromagnet and power supply system are described in a table. Also described are the vacuum chamber and accelerating field (obtained by 53 paired resonators with ferrite rings, which operate at the 30-th harmonic of revolution and give accelerating potential of 350 kilovolts). The ring tunnel and the general arrangement of the accelerator are shown in figures and described. The building for the injector and portions of the ring tunnel from the injector to the experimental room have been completed in the main and are ready for installation of equipment. This room, in the form of a single-aisle building without internal supports, permits one to work on beams brought into the inner and outer sides. A 90-meter arch covers this room, whose overall length is 150 meters. Provisions have been made for a second experimental room at the southwest part of the ring. Orig. has 4 figures, 2 tables.

ASSOCIATION: Institute teoreticheskoy i eksperimental'noy fiziki GKAE SSSR (Institute of Theoretical and Experimental Physics, GKAE SSSR). (2) Nauchno-issledovatel'skiy institut elektrofizicheskoy apparatury imeni D. V. Yefremova GKAE SSSR (Scientific Research Institute of Electrophysical Apparatus, GKAE SSSR).

Card 3/4



L 43088-65

ACCESSION NR: AT5007918

(3) Radiotekhnicheskiy institute AN SSSR (Radio Engineering Institute, Academy of Sciences SSSR). (4) Gosudarstvennyy proyektnyy institut GKAE SSSR (State Planning Institute, GKAE SSSR).

SUBMITTED: 26May64 ENCL: 00 SUB CODE: EE, MP

NO REF SOV: 002 OTHER: 001

Card 4/4

L 46156-65 EWT(m)/EPA(w)-2/EWA(m)-2 Pt-7/Pab-10 IJP(c) GS

Title: The [illegible] Gev proton synchrotron as the injector of an automatically controlled 1000-Gev accelerator

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963. Trudy. Moscow, Atomizdat, 1964, 213-216

TOPIC TAGS: high energy accelerator, injector, synchrotron, [illegible]

ABSTRACT: The automatically controlled ("cybernetic") accelerator has been envisioned as a system consisting of three stages: an initial linear accelerator, a preliminary ring accelerator (booster), and a final ring accelerator (reported on by E. L. Burshteyn, A. A. Vasil'yev, and A. L. Mints, present collection, p. 67). Among the increasing numbers of possible methods of injection is the direct injection from a linear accelerator [illegible] discusses a ring-type injector. The injection energy selected [illegible]

Card [illegible]

example, the booster energy must be around 10 Gev for a 300-Gev accelerator according to calculations by M. Sands (CERN, 1959; Brookhaven, 1961); it is 6 Gev for a 300-1000 accelerator design of I. P. Blewett (Brookhaven, 1961); it is 15 Gev for a 500-Gev accelerator design reported by V. V. Vladimirskiy, D. T. Koshkarev, and

$$(\alpha c T_{II})^2 N Z_{res}$$

particles; c is the velocity of light; N is the number of accelerator resonators; Z_{res} is the resonator impedance; ρ and ρ_{II} are the radii of

L 46156-65

ACCESSION NR: AT5007919

curvature of the electromagnets of the booster and final ring, respectively; T_{II} is the duration of injection in the final ring $T_{II} \approx 2T_0 T_{II}/p$ for sinusoidal variation of the booster field (H). Noting the sensitivity of p to changes in the various variables, the author proposes 7 Gev as a reasonable value for E_{max}. He fixes the other main variables as T = 10 msec (50 cycles of acceleration a second) and R_I = 60 meters (R_{II} calculated to equal 3300 meters by Bunshteyn et al.). Using these main values, the author calculated 28 basic parameters of the booster (given in a table). He concludes that the injection of particles into the booster can be effected by a linear accelerator, ring phasotron, isochronous cyclotron, and synchrotron. Since the value of the maximum field strength of 10^4 oersteds corresponds to a radius of curvature of the electromagnet of 23 meters, which is close to that (25.25 meters) of the Yerevan synchrotron (discussed by Yu. G. Agbalyan et al., present collection, p. 235), the author considers the magnetic system on the basis of the known characteristics of the electromagnet of the Yerevan synchrotron. Also considered on the same basis: the physical dimensions and arrangements; the characteristics of the accelerating field; the hf acceleration system; the means for the exit of the beam from the booster into the automatically controlled accelerator. "The author offers his thanks to S. M. Rubchinskiy for his constant interest in this work, and to V. V. Yelyan, A. A. Pletnev, and A. P. Lavrov for their assistance in the design computations." Orig. art. has 1 table.

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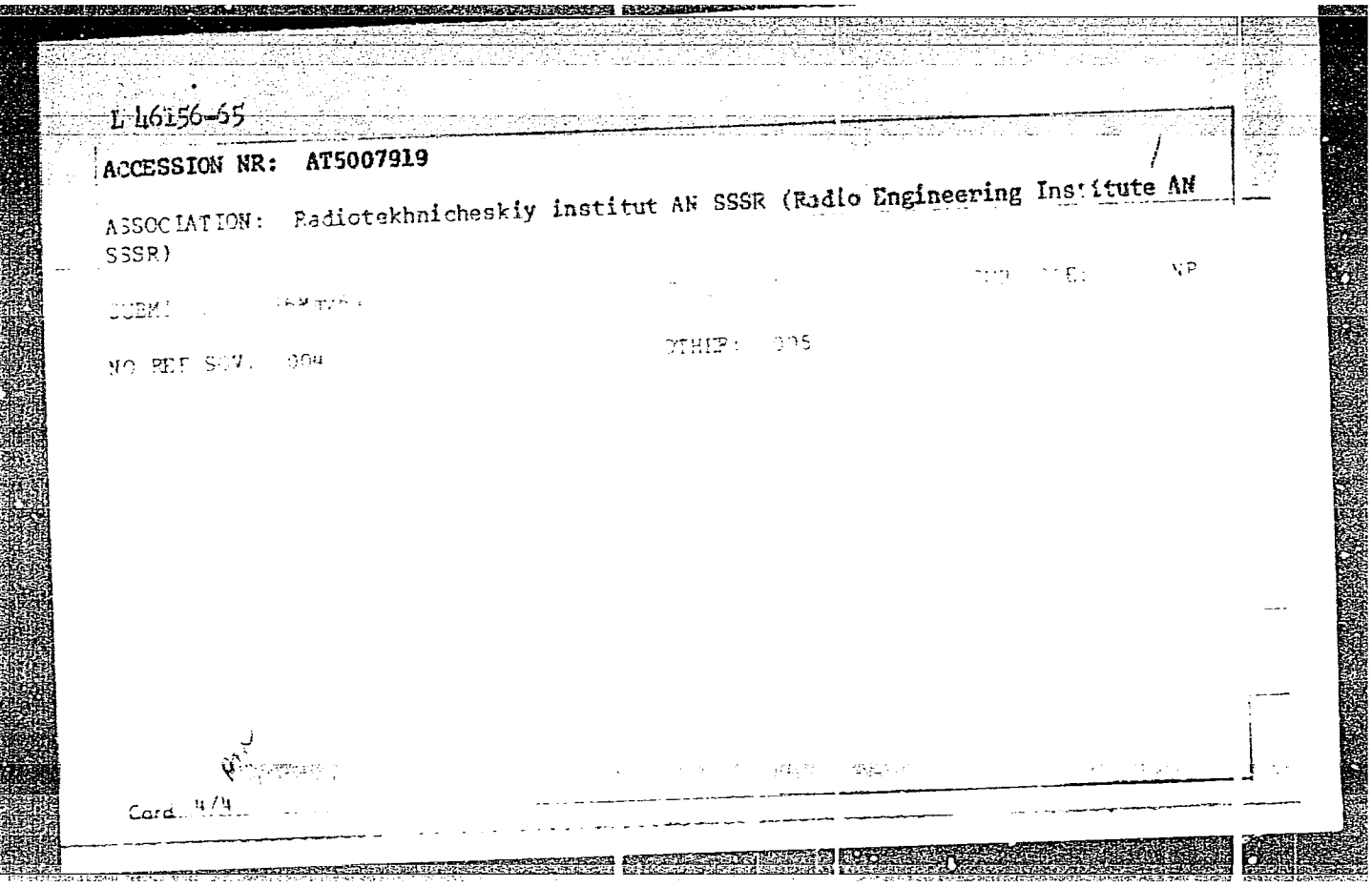

L 46156-65

ACCESSION NR: AT5007919

ASSOCIATION: Radiotekhnicheskiy institut AN SSSR (Radio Engineering Institute AN SSSR)

SUBM: [illegible] ENCL: NP

NO REF SOV: 004 OTHER: 005

Card 1/4

L 3778-66 EWT(m)/EWA(m)-2 IJP(c) GS S/0000/64/000/000/0932/0936

ACCESSION NR: AT5007965

AUTHOR: Vodop'yanov, F. A.; Zhukovskiy, L. S.; Zalmanzon, V. B.; Ivanov, Yu. S.; Izergina, Ye. V.; Kuz'min, A. A.; Prokop'yev, A. I.; Temkin, A. S.; Rubchinskiy, S. M.

TITLE: System for the generation of the accelerating field of a 70-Gev proton synchrotron 19

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963. Trudy. Moscow, Atomizdat, 1964, 932-936

TOPIC TAGS: high energy accelerator, synchrotron, particle beam, magnetic field

ABSTRACT: After the development of a high-precision system of frequency control of the accelerating field of the proton 50-60 Gev synchrotron with critical energy compensation (Hints, A. L., et al., Proc. International Conference on High Energy Accelerators and Instruments, CERN 1959), it was decided to achieve an alternative accelerator with transition through the critical energy, which makes it possible to increase the energy to 70 Gev. In this modification of the accelerator serious difficulties are encountered with the realization of a system for generating an accelerating field with frequency control only according to the H-program. Therefore,

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ACCESSION NR: AT5007965

it was decided to achieve a system with twin frequency control: rough, according to the *H*-program, and precise, according to the information on the radial and phase position of the accelerated particle beam. The present report discusses the principal characteristics governing the achievement of a programmed FM-generator, a system of frequency control according to information of the position of the accelerated particle bunches, and accelerator installation. The programmed FM-generator consists of the usual elements: transducer of the derived magnetic field strength (inductive coil in the gap of the measuring electromagnet), electronic switch, tube integrator, modulator, FM-oscillator, phase manipulator, amplitude modulator of accelerating voltage, amplifier-distributor, and a system of cable contacts. To obtain energy increase per revolution of ΔE = 166 Kev for a rate of change of magnetic field strength of $\dot{H}$ = 550 oersteds/second and $\phi_s = 30°$, provision is made for the application of 53 accelerator stations with rated input of 7 kilovolts and 6 kilowatts power. Provisions are also made for the short-duration increase of this voltage, 1.8 times up to the time of beam bunching (around 15 microseconds), and its slow decrease to about 2 times less toward the end of the acceleration cycle with the aim of preserving constant equilibrium phase during the fall in the magnetic field growth rate. The system of frequency control of the accelerating field according to the information on the accelerated particle beam position is similar in

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ACCESSION NR: AT5007965

principle of operation to a system described by Yu. S. Ivanov and A. A. Kuz'min (*Pribory i tekhnika eksperimenta*, No. 4, 106, (1962)), which was intended to stabilize the position of the center of gravity of the beam according to radius and phase. Orig. art. has: 1 figure.

ASSOCIATION: Radiotekhnicheskiy institut AN SSSR (Radio Engineering Institute, AN SSSR)

SUBMITTED: 26May64 ENCL: 00 SUB CODE: NP

NO REF SOV: 001 OTHER: 001

Card 3/3

L 26411-66 EWA(h)/EWT(1)

ACC NR: AM5020746 Monograph UR/ 33 31 B+1

Vodop'yanov, F. A.

Some problems in the theory of wide-band generators (Nekotoryye voprosy teorii shirokodiapazonnykh generatorov) Moscow, 1964. 150 p. illus., biblio.

TOPIC TAGS: oscillator theory, UHF oscillator, electromagnetic wave oscillation, band spectrum, signal noise separation, frequency multiplication

PURPOSE AND COVERAGE: This book is intended for engineers and scientists concerned with the design and operation of electronic equipment used in the production of nuclear energy. It may also be used by students of advanced courses in schools of higher education. The book deals with investigations carried out by the author during the period 1949--1963 on the development of a UHF oscillator with precision frequency modulation. Expressions are derived for quantity estimation of the frequency change during amplitude variations, nonlinear frequency correction, nonlinear and parametric effects in reactive elements of the self-excited oscillator, spectral density, parametric and frequency fluctuation noise, frequency dependence on the rate of parameter modulation and evaluation of filter discrimination of self-excited oscillators. In addition, some aspects of measuring small fluctuations of frequency and amplitude are described. The analysis was carried out by the integral equation method and by statistical processing of the oscillator effect on a Delta-pulsed plate current. The author thanks A. L. Mints, Academician, S. M. Rubchinskiy, Doctor of Technical Sciences, S. M. Rytov, Doctor of Physicomathemati-

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cal Sciences, Professor, V. P. Yakovlev, Candidate of Technical Sciences, and Yu. F. Dushin for their cooperation.

TABLE OF CONTENTS [abridged]:

L 26411-66

ACC NR: AM5020746

SUB CODE: 09,17/ SUBM DATE: 05Jul63/ ORIG REF: 048/ OTH REF: 016

Card 4/4

L 6384-66 EWT(l)/EWA(h)
ACC NR: AP5026750 SOURCE CODE: UR/0286/65/000/017/0025/0025

30
GB

INVENTOR: Vodop'yanov, F. A.

TITLE: A generator of frequency modulated sinusoidal oscillations with feedback through an FM discriminator. Class 21, No. 174222 [announced by the Enterprise of the State Committee on Radio Electronics SSSR (Predpriyatiye Gosudarstvennogo komiteta po radioelektronike SSSR)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 17, 1965, 25

TOPIC TAGS: signal generator, electromagnetic wave generator, fm

ABSTRACT: This Author's Certificate introduces a generator of frequency modulated sinusoidal oscillations with feedback through an FM discriminator. The unit contains an FM-AM converter, an amplitude demodulator for the output voltage of the FM-AM converter, and an amplitude demodulator for the automatic control channel of the generator amplitude. Provision is made for reducing the effect which the shape of the plate current curve has on the stability of the modulation characteristics of the generator by feeding the output voltage from the FM-AM converter to the amplitude demodulator for the automatic control channel of the generator amplitude.

UDC: 621.373.421

SUB CODE: EC/ SUBM DATE: 19Mar64/ ORIG REF: 000/ OTH REF: 000

Card 1/1

ACC NR: AP5026749

SOURCE CODE: UR/0286/65/000/017/0025/0025

INVENTOR: Vodop'yanov, F. A.

ORG: none

TITLE: Method of generating electromagnetic oscillations. Class 21, No. 174221

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 17, 1965, 25

TOPIC TAGS: microwave component, electromagnetic wave generation, microwave generator

ABSTRACT: The proposed method of generating continuous electromagnetic oscillations in the microwave range consists in directing infrared or thermal radiation on a dielectric polarized beforehand by a constant electric field (see figure). The latter has a variable dielectric constant which depends on the applied voltage. Oscillations

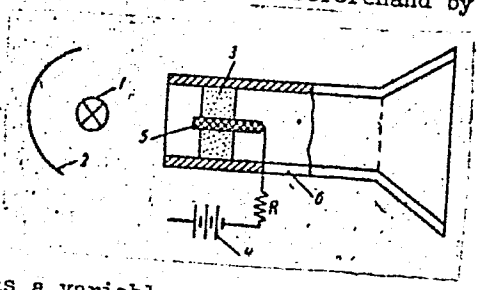

Fig. 1. Microwave generator

1 - Radiation source; 2 - focusing screen; 3 - dielectric plate; 4 - d-c source; 5 - internal electrode; 6 - waveguide shell.

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UDC: 621.373.1

L 5362-66

ACC NR: AP5026749

of the difference frequency produced in the dielectric are removed by means of a radio waveguide or a cavity resonator. Orig. art. has: 1 figure. [DW]

SUB CODE: EC/ SUBM DATE: 28Mar47/ ATD PRESS: 4137

EC

Card 2/2

L 01808-67 EWT(1)
ACC NR: AP6030576 SOURCE CODE: UR/0413/66/000/016/0057/0057

INVENTOR: Vodop'yanov, F. A.

ORG: none

TITLE: Wide-band generator. Class 21, No. 184941

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 16, 1966, 57

TOPIC TAGS: generator, wide band generator, frequency modulation, high frequency generator

ABSTRACT: An Author Certificate has been issued for a wide-band generator containing two or more frequency-modulation generators overlapping successively the given frequency band and a high-frequency commutator connecting the generators to the general output at the moment of coincidence of their frequency and phase. To ensure the zero phase shift and the frequency equality of two adjacent generators at the moment of commutation, an automatic phase frequency circuit is connected to the output of one generator, the output of which is connected to the high-frequency commutator. [Translation]

Card 1/1 SUB CODE: 09/ SUBM DATE: 09Oct64/ UDC: 621.373.42 [NT]

VODOP YANOV, G.V.

AUTHORS: Rybnikov, V.A., Volynsk[illegible] Ye.A., Vodop'yanov, G.V. 131-3-5/16

TITLE: The Employment of Hig[illegible] Aluminous [illegible]cks in the Head-Pieces of the Regenerators of Op[illegible] He[illegible]r[illegible]nac[illegible]s (Sluzhba vysokoglinozemistogo kirpicha v [illegible]adkak[illegible], [illegible]erx[illegible]orx[illegible] martenovskikh pechey)

PERIODICAL: Ogneupory, 195[illegible]. Vo[illegible], Nr 3, pp. 109-111 (USSR)

ABSTRACT: Highly aluminous bricks were built into the regenerators of an 80 t open-hearth furnace, where they were tested. The open-hearth furnace worked with solid case-hardened material and was heated with oil. The bricks, which were produced by the Semiluksk plant for refractories, were placed into the 12 top rows of air-head-pieces, where temperatures of 1350-1420° and 1500° were attained. These bricks were found to be superior to fire clay bricks. Furthermore, the chemical composition and properties of highly aluminous bricks are given as well as their structure. According to calculated data these bricks contain 61% mullite, 22% siliceous glass, and 17% corundum, which must be looked upon as unfavorable because siliceous glass has a low viscosity when liquefied. The presence of 22% siliceous glass is indicative of a not completed reaction be-

Card 1/2

The Employment of Highly Aluminous Bricks in the Head-Pieces of the Regenerators of Open-Hearth Furnaces

131-3-5/16

tween clay and technical alumina. The bricks contain much corundum, not enough mullite, and an excess quantity of glass, which reduces their slag-resistance. The bricks withstood 705 smelts, i.e. twice as many as ordinary fire clay bricks. After having been used the bricks of the uppermost row had a considerable amount of slags and showed much wear; three different zones could be distinguished (see table), which are described in detail. The following conclusions are drawn: 1.) The highly aluminous bricks showed great durability and were found to be superior to Forsterite-, Chromodinas- and fire clay bricks. 2.) The main cause of wear is the destruction of their mullite phase and the simultaneous formation of phases of low resistance at high temperatures. The phases $Fe_2.SiO_4$, Zn_2SiO_4 and $FeO.Fe_2O_3$ are concerned here. Better results may be expected from using refractory-mullite, corundum-mullite, or corundum products, which contain smaller quantities of silicon oxide. There is 1 table and 1 Soviet reference.

ASSOCIATION: Leningrad Institute for Refractories (Leningradskiy institut ogneuporov)

AVAILABLE: Library of Congress

Card 2/2 1. Refractory materials-Test results 2. Open hearth furnaces-Equipment

RYBNIKOV, V.A.; VOLYNSKIY, Ye.A.; VODOP'YANOV, G.V.

Life of high alumina firebrick in open hearth furnace regenerator checkers. Ogneupory 23 no.3:109-111 '58. (MIRA 11:4)

1. Leningradskiy institut ogneuporov (for Rybnikov). 2. Izhorskiy zavod (for Volynskiy, Vodop'yanov).
(Firebrick) (Open-hearth furnaces)

VODOP'YANOV, G.V.

BLUVSHTEYN, M.N.; VOLYNSKIY, Ye.A.; VODOP'YANOV, G.V.

Production and use of unburned magnesite-chrome bricks for the crown of Izhora plant open-hearth furnaces. Ogneupory 22 no.2: 55-64 '57. (MLRA 10:4)

1. Leningradskiy Institut ogneuporov (for Bluvshteyn). 2. Izhorskiy zavod (for Volynskiy, Vodop'yanov).
(Firebrick) (Izhora Valley--Open hearth furnaces)

FRUMKIN, G.; VODOP'YANOV, I.; KOROBKOV, A.

Building control by State Bank branches. Den. i kred. 21 no.3: 39-46 Mr '63. (MIRA 16:3)

1. Nachal'nik tekhnicheskogo otdela Leningradskoy gorodskoy kontory Gosbanka (for Frumkin). 2. Nachal'nik tekhnicheskogo otdela Stavropol'skoy krayevoy kontory Gosbanka (for Vodop'yanov). 3. Starshiy inzh. Stavropol'skoy krayevoy kontory Gosbanka (for Korobkov).

(Construction industry—Auditing and inspection)
(Banks and banking)

VODOP'YANOV, I.L., inzh.; VOLCHEK, V.I., inzh.; FEDOROV, M.T., inzh.

Reliability of jaw-type crushing machines. Stroi. i dor. mash. 10 no.10:30-31 O '65. (MIRA 18:10)

VODOP'YANOV, Konstantin Alekseevich (1908-1962) 1964

PHYSICS-Dielectrics
High Frequencies

BOGORODITSKIY, Nikolay Petrovich; VOLOKOBINSKIY, Yuriy Mikhaylovich; VOROB'YEV, Aleksandr Akimovich; TAREYEV, Boris Mikhaylovich; RENNE, V.T., retsenzent; VOLOP'YANOV, K.K., retsenzent; KAZARNOVSKIY, D.M., nauchn. red.; PAVLOVA, L.S., red.

[Theory of dielectrics] Teoriia dielektrikov. Moskva, Energiia, 1965. 344 p. (MIRA 18:12)

VODOP'YANOV, K.S., inzh.

Design of curves with the method of cancellation of not considered half-shifts. Put' i put.khoz. 6 no.6:34-36 '62. (MIRA 15:7)

1. Nachal'nik Chulymskoy distantsii Zapadno-Sibirskoy dorogi.
(Railroads—Curves and turnouts)

VODOP'YANOV, K.S., inzh.

What we saw while visiting trackworkers in the German Democratic Republic. Put' i put.khoz. no.1:46-48 Ja '59. (MIRA 12:2)

1. Nachal'nik distantsii puti, stantsiya Bereza-Kartuskaya Belorusskoy dorogi.
(Germany, East--Railroads--Track)

VODOP'YANOV, K.S.

Improvement of production and life. Put' i put.khoz. no.6:41-43 Je '57. (MIRA 10:7)

1. Nachal'nik Bereza-Kartuzskoy distantsii puti Belorusskoy dorogi.
(Bereza Kartuskaya--Railroads--Employees)

BAYDALA, V.Ya., inzh.; VODOP'YANOV, K.S., inzh.

High-quality track repairing has to be at the base of track maintenance and operation work. Put' i put.khoz. 7 no.8:45-46 '63. (MIRA 16:9)

1. Zamestitel' nachal'nika Kalachinskoy distantsii puti, Zapadno-Sibirskoy dorogi (for Baydala). 2. Nachal'nik Chulymskoy distantsii puti Zapadno-Sibirskoy dorogi (for Vodop'yanov).
(Railroads—Track)

VODOP'YANOV, L. K.

Vodop'yanov, L. K. [Fisicheskiy institut imeni P.N. Lebedeva AN SSSR (Physical Institute imeni P.N. Lebedev, AS USSR)] Methods of Measuring the Temperature Dependency of the Dielectric Constant and Losses by Using a Ceramic Resonator

(The Physics of Dielectrics, Proceedings of the All-Union Conference on the Physics of Dielectrics) Moscow, Izdat AN SSSR, 1958, 248 p. Numerous articles.

This volume publishes papers presented at the All-Union Conference on the Physics of Dielectrics, held in Leningrad in June 1956. Sponsored by the Physics of Dielectrics Laboratory of the Physical Institute imeni Lebedev of the AS USSR, and by the Kuybyshev Industrial Institute imeni Kuybyshev. Responsible editor: [illegible]

SOV/58-59-5-10840

Translation from: Referativnyy Zhurnal Fizika, 1959, Nr 5, pp 133 - 134 (USSR)

AUTHOR: Vodop'yanov, L.K.

TITLE: Method for Measuring the Temperature Dependence of the Dielectric Constant and Losses Using a Ceramic Resonator

PERIODICAL: V sb.: Fiz. dielektrikov. Moscow, AS USSR, 1958, pp 137 - 144. Diskus. p 180.

ABSTRACT: The author submits a detailed description of a device for measuring ε and $tg\delta$ in solid dielectrics at a frequency of $f = 3 \times 10^9$ c and in the $20 \div 500^{\circ}C$ temperature range. The fundamental component of the device consists of a ceramic resonator of the semicoaxial type. A supplementary capacitor (also ceramic) containing the dielectric to be investigated, is placed in the resonator gap. By measuring the resonance-frequency shift on introducing the dielectric, and by using calibration curves, it is possible to calculate ε and $tg\delta$. These quantities were measured for various titanates of the metals of the second group of the periodic table. (Fiz. in-t AS USSR).

Card 1/1

V.I. Sarafanov

S/048/60/024/02/09/009
B006/B014

24.7700

AUTHORS: Vodop'yanov, L. K., Skanavi, G. I. (Deceased)

TITLE: The Effect of the Bombardment of Polycrystalline Titanates With Slow Neutrons Upon Their Dielectric Properties

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 2, pp. 253 - 256

TEXT: The article under review was read at the Second All-Union Conference on the Physics of Dielectrics (Moscow, November, 20-27, 1958). The relationship between the existence of defects and the dielectric properties of dielectrics has been pointed out repeatedly. For this reason, polarization relaxation occurs at high concentrations of vacancies as, e.g., in crystals of the perovskite type. This polarization relaxation is effected by a high dielectric constant and high dielectric losses. The authors studied these phenomena in ion crystals in the case of artificially increased concentration of defects. For this purpose, different titanates (slow neutron capture cross section of 5.6 barns) were bombarded with neutrons in a research reactor. The samples were exposed both in dry and water-containing holes of the reactor (the water served for cooling the

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samples). The mean temperature in the holes was 70 - 80°C. The effect of fragments, beta- and gamma radiation on the samples was negligible. The (n,γ) reaction proceeding on titanium is described as follows:

$$I: {}_{22}Ti^{50} + {}_{0}n^{1} \rightarrow {}_{22}Ti^{51} + \gamma; \quad II: {}_{22}Ti^{51} \xrightarrow{(72\ d)} {}_{23}V^{51} + {}^{-}\beta(0.45\ Mev) + \gamma(1\ Mev) \xrightarrow{(3min)} {}_{23}V^{51} + {}^{-}\beta(1.6\ Mev)$$

L. V. Groshev et al. studied the energy spectrum of the gamma quanta of I and found the peaks 1.39, 1.6, 4.8, 6.42, and 9.17 Mev. Herefrom it results that the recoil energy of the Ti nucleus is about 30 ev in the departure of a gamma quantum of lowest energy. On the other hand, the energy necessary to remove an atom from its lattice site is only 25 ev approximately. Hence, the energy of gamma quanta occurring according to reaction I is sufficiently large for the production of a Frenkel'-type defect. Whereas reaction I proceeds in the reactor only in the case of direct neutron bombardment, reaction II also takes place after the sample has been removed from the reactor. The time necessary for the production of defects by reaction II is the longer the longer is the half-life of the element under consideration. In this way the authors studied the titanates of magnesium, zinc, calcium, strontium, bismuth,

barium, and strontium-bismuth titanate. The samples had the shape of tabloids, a diameter of 12 mm, and thicknesses of 0.5, 0.8, and 1.0 mm. The investigations were carried out with the integral fluxes 10^{17}, 10^{18}, and 10^{19} n/cm^2. The dielectric loss angle sharply increased at 10^{18} n/cm^2. This effect was considerably stronger when the samples were bombarded in the water-containing holes (due to cooling). Numerical values of the measurement of tan ϑ are listed in a table. ε was increased only in the case of zinc- and magnesium titanate. For these two substances the authors also studied the frequency dependence of ε and tan ϑ (at room temperature - Figs. 1 and 2). It was shown that polarization has relaxation character. tan ϑ exhibits marked frequency dependence with a maximum. Fig. 3 also shows the frequency dependence of ε and tan ϑ at different radiation doses in the dry hole. Thus, it is shown that a high concentration of Frenkel'-type defects may be produced by high-flux irradiation of ion crystals with slow neutrons. These defects cause polarization relaxation. The authors finally thank F. L. Shapiro for his discussions. There are 3 figures, 1 table, and 3 Soviet references.

The Effect of the Bombardment of Polycrystalline Titanates With Slow Neutrons Upon Their Dielectric Properties

S/048/60/024/02/09/009
B006/B014

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Institute of Physics imeni P. N. Lebedev of the Academy of Sciences, USSR)

Card 4/4

29607

24.7800 (1043, 1145, 1153)
15.2640

S/120/61/000/004/017/034
E194/E355

AUTHOR: Vodop'yanov, L.K.

TITLE: Measurement of the electrical properties of neutron-irradiated dielectrics

PERIODICAL: Pribory i tekhnika eksperimenta, no. 4, 1961, pp. 116 - 118

TEXT: The equipment described in this article is used to measure at high vacuum and over the temperature range of -150 to +400 °C, the permittivity, tan δ (dissipation factor) and resistivity of highly radioactive specimens of solid dielectrics. The copper base on which the measuring equipment rests can be cooled by liquid nitrogen to a temperature of -150 °C. The base-plate can later be heated by a small electric heater fitted beneath it. The lower electrode is insulated with a sheet of crystalline quartz cut perpendicular to the main optical axis, giving both adequate electrical insulation and thermal conductivity. The upper electrode is a flat disc and special care is taken to ensure that it is parallel to the lower electrode. The pressure applied between the electrode depends on whether

Card 1/3

Measurement of ....

the test specimens have metallic electrodes deposited on them or not. The electrode system can be evacuated by means of a backing pump and diffusion pump. The vacuum-tight joints for the electrodes and vessels are described; the seals are made of fluoroplast. The conventional circuit used to measure resistivity had a sensitivity of 1.3×10^{-15} A per division and the electrometer valve was carefully screened. Permittivity and tan δ measurements were made in the audio-frequency range on a standard bridge, type МЛЕ-1 (MLE-1) and in the radio-frequency range on a Q-meter, type КВ-1 (KV-1). Results obtained with the equipment are published in Ref. 2 (L.K.Vodopyanov - Fiz. tverdogo tela. 1961, III, No. 8, 2331). The tan δ of Zn_2TiO_4 before and after irradiation is plotted in Fig. 3 as a function of temperature (Curve 1 - before, Curve 2 - after irradiation). The results obtained in vacuum are more reliable than those made in air because ionization and contamination problems are avoided. Acknowledgments are expressed to V.S. Vavilov and Ye.A. Konorova for interest in the work.

Card 2/3

19507
S/120/61/000/004/017/034
E194/E355

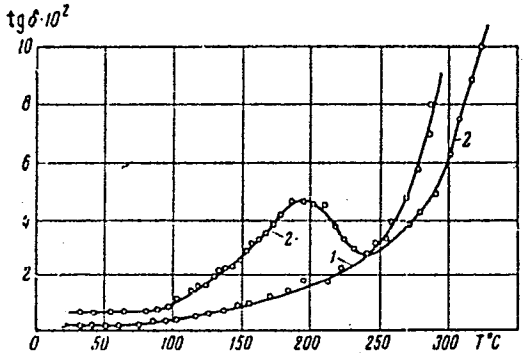
Measurement of ....

There are 3 figures and 2 Soviet-bloc references.

ASSOCIATION: Fizicheskiy institut AN SSSR (Physics Institute of the AS USSR)

SUBMITTED: December 26, 1960

Fig. 3:



Card 3/3

27283

S/181/61/003/008/013/034
B102/B202

15.2650

AUTHOR: Vodop'yanov, L. K.

TITLE: Nature of dielectric losses in polycrystalline magnesium- and zinc titanates irradiated by high integral slow-neutron fluxes

PERIODICAL: Fizika tverdogo tela, v. 3, no. 8, 1961, 2331 - 2335

TEXT: Together with G. I. Skanavi the author studied the dielectric properties of titanates of various metals which had been exposed to slow-neutron irradiation. These studies were described in a previous paper (Izv. AN SSSR, ser. fiz. XXIV, No. 2, 253, 1960). The maximum in the frequency dependence of tan δ and the increase of ε in the same frequency range had been known already at that time. These experiments were made at room temperature in air. Further studies showed that a considerable surface effect occurred which was due to the adsorption of ions and polar molecules. In order to eliminate this effect the author devised an instrument (PTE, vyp. 4, 1961) in which ε, tan δ, and the conductivity σ can be measured in a high vacuum. In continuation of these

Card 1/5

Nature of dielectric...

studies the author reports on the measurement made in $MgTiO_3$ and Zn_2TiO_4. The samples had the shape of small discs (diameter: 12 mm, thickness: 0.5 mm) to which the Pt-electrodes were applied. ε and tan δ were measured before and after neutron irradiation (in a reactor with an integral flux of 10^{18} cm^{-2}) in the audiofrequency range with an МЛЕ-1 (MLYe-1) and in the radiofrequency range with a Q-meter КВ-1 (KV-1). σ was measured by a bridge electrometer (sensitivity $1.3 \cdot 10^{-15}$ a/scale unit). Studies of the surface effects showed that they entail additional losses which decrease with an increase in the frequen... Fig. 2 shows the frequency dependence of ε'' (in the vacuum) of $MgTiO_3$. This curve is compared to a theoretical one obtained by Debye's formu... . While a symmetrical curve was obtained for $MgTiO_3$ which deviates only little from the theoretical one, a slightly asymmetrical curve which is considerably wider than the theoretical one was obtained for zinc titanate. The difference in the frequency dependences of ε'' of the two titanates is explained by the fact that in $MgTiO_3$ only the Ti nucleus has a large capture cross section for slow

Card 2/5

Nature of dielectric...

neutrons, in Zn_2TiO_4 it is the Ti and the Zn nucleus. In the former case one group of defects occurs, in the second one two. If Debye's formula is applied to $MgTiO_3$ which has only one relaxation time, $\tau_o = 2 \cdot 10^{-4}$ sec is obtained as the most probable relaxation time. Thus, the activation energy of the relaxing particles can be calculated from the equation $u = kt(\ln\nu - \ln\frac{1}{\tau_o})$. ν is the eigenfrequency of the lattice ions. For $\nu = 10^{12}$ sec^{-1}, u = 0.7 ev, for $\nu = 10^{13}$ sec^{-1}, u = 0.8 ev. Also the temperature dependence of ε and of tan δ was measured in the vacuum before and after irradiation. Fig. 4 shows the result obtained for $MgTiO_3$. Electrical conductivity (n-type) is increased by irradiation. For zinc titanate this increase is considerably higher than for $MgTiO_3$. The $\sigma(t)$ curves first show a rapid decline after which σ remains almost constant. The author arrives at the conclusion that the change of the dielectric properties of the titanates is due to irradiation which produces vacancies and dislocations. The frequency and temperature maxima of the losses

Card 3/5

Nature of dielectric...

have relaxation character. Most probably a nucleus, e. g., the Ti nucleus captures a neutron thus causing the formation of an excited compound nucleus. A γ-quantum is emitted upon its de-excitation. If its energy is sufficiently high, the emitter is removed by the recoil from its lattice site. The surface effect occurring upon irradiation in air is higher (at 50 cps by one order of magnitude) than the volume effect. Finally, the author thanks V. S. Vavilov and Ye. A. Konorova for discussions. There are 6 figures and 6 Soviet-bloc references.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR Moskva
(Physics Institute imeni P. N. Lebedev AS USSR, Moscow)

SUBMITTED: March 6, 1961

21.7100
15.2640

30787
S/181/61/003/011/028/056
B125/B102

AUTHORS: Vodop'yanov, L. K., and Konorova, Ye. A.

TITLE: Electrical properties of neutron-bombarded $SrTiO_3$ single crystals

PERIODICAL: Fizika tverdogo tela, v. 3, no. 11, 1961, 3426-3428

TEXT: The dielectric constant ε, the dielectric losses, the conductivity, and the optical absorption in the visible and infrared regions of the spectrum of $SrTiO_3$ single crystals, grown by the Verneuil method, were measured before and after irradiation with integral fluxes (10^8 cm^{-2}) of slow neutrons. The temperature dependence of ε and $\tan\delta$ measured before and after irradiation coincided in the interval of 20-200°C. The temperature dependence of dielectric constant and conductivity at 1 kc/sec is shown in Fig. 1. An abnormal maximum of hitherto unknown nature was detected by Lipareva at 470°C. It vanished after irradiation, and a weaker maximum appeared at higher temperatures. Irradiation seemed to increase the diffusion coefficient. As a result, oxygen atoms in the

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Electrical properties of...

lattice migrate to their proper sites. On the other hand, the variation of the temperature dependence might be due to a lattice defect. Heating in a vacuum of $\sim 10^{-6}$ mm Hg leads to irreversible processes caused by oxygen losses for instance, to an irreversible increase of the electrical conductivity of $SrTiO_3$ crystals. The activation energy was calculated from the temperature dependence of the electrical conductivity and was found to be 0.44 ev. It is difficult to draw conclusions as to the mechanism of conductivity variations from the available experimental data. The additional electrical conductivity caused by irradiation seems to consist of two components: One of them is caused by radiation defects, and the other is due to ionization processes occurring in the sample caused by its radioactivity. The ultraviolet and infrared absorption edges coincided satisfactorily with experimental data. No essential variations were observed in the short-wave range of the spectrum extending to 1.5 μ. The samples had a significant transparency (up to 15 %) in the long-wave range of the spectrum after irradiation. There are 2 figures and 3 references: 2 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: J. A. Noland. Phys. Rev., 94, 3, 724, 1954;

Card 2/4 3

S/181/61/003/011/028/056
B125/B102

Electrical properties of...

H. W. Landy. Phys. Rev., 113, 3, 795, 1959.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR Moskva
(Physics Institute imeni P. N. Lebedev AS USSR, Moscow)

SUBMITTED: June 14, 1961

Fig. 1. Temperature dependence of dielectric constant ε and conductivity for alternating current, j, before and after irradiation of an $SrTiO_3$ single crystal.

Legend to Fig. 1: (1) ε before irradiation; (2) j before irradiation; (3) ε after irradiation; (4) j after irradiation.

Fig. 2. Temperature dependence of electrical conductivity for direct current of an $SrTiO_3$ crystal before and after irradiation.

Legend to Fig. 2: (1) first direct way; (2) first reverse way; (3) second direct way; (4) second reverse way; (5) direct way after irradiation; (6) reverse way after irradiation.

Card 3/4 3

28916
S/170/61/004/011/019/020
B108/B138

24.7800

AUTHORS: Vodop'yanov, L. K., and Krasnopevtsev, V. V.

TITLE: Methods of irradiating solid dielectrics in a nuclear reactor

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 4, no. 11, 1961, 129-131

TEXT: The authors present some methods of irradiating solids by slow neutrons from a nuclear reactor with a view to studying the resulting dielectric properties. In earlier works (Vodop'yanov L. K. and Skanavi G. I. "Izv. AN SSSR", ser fiz., 24, 253-257, 1960) they had measured the past-irradiation dielectric properties of titanates of the second group in the periodic system, and of alkali halides. Platinum electrodes, applied to the specimens by evaporation coating, proved to be the most stable. The samples were sealed into aluminum containers and placed in special cavities in a heavy-water test reactor. The specimens in the container must not be allowed to screen one another. The specimens were subjected chiefly to slow and fast neutrons and to gamma rays. Electrons, uranium fission fragments, alphas, etc., which usually have to

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Methods of irradiating solid...

be considered as well, had almost no effect in the authors' experiments. In order to irradiate the specimens with thermal neutrons with a low enough percentage of fast neutrons, test channels in the reflector of the reactor were used. Cadmium filters were used to absorb the thermal neutrons, so that the effect of the fast neutrons and of gamma-background alone could be studied. All samples irradiated by thermal neutrons showed considerable beta and gamma activity. V. S. Vavilov and S. A. Gavrilov are thanked for discussions and collaboration. There are 2 Soviet references.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR, g. Moskva (Institute of Physics imeni P. N. Lebedev of the Academy of Sciences USSR, Moscow)

SUBMITTED: June 3, 1961

Card 2/2

VODOP'YANOV, L.K.

Measuring electric properties of neutron-irradiated dielectrics. Prib. i tekh.eksp. 6 no.4:116-118 Jl-Ag '61. (MIRA 14:9)

1. Fizicheskiy institut AN SSSR.
(Dielectics--Electric properties--Testing)

VODOP'YANOV, L.K.

6
VODOP'YANOV, L. K.

Dissertation for the degree of Candidate of Physicomathematical Sciences at the Institute of Crystallography in 1962:

"Effect of Irradiation by Slow Neutrons on the Dialectic Properties of the Titanates of Several Metals."

Vest. Akad. Nakad SSR. No. 4, Moscow, 1963, pages 119-145

33346
S/181/62/004/001/012/052
B102/B138

24.7700 (1035, 1043, 1385)

AUTHOR: Vodop'yanov, L. K.

TITLE: Electrical conductivity of magnesium and zinc titanates exposed to neutron irradiation

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 74 - 76

TEXT: Disc-shaped $MgTiO_3$ and $ZnTiO_3$ specimens (0.5 mm thick, 12 mm in diameter) were irradiated by slow neutrons and the influence of this irradiation on the temperature dependence of electrical conductivity was studied up to 350°C. The measurements were made in a special vacuum apparatus whose electrometer had a sensitivity of $1.5 \cdot 10^{-15}$ a/scale unit. In measurements before irradiation it was found that when the specimens were heated in high vacuo, σ increased irreversibly. log σ was plotted as a function of $1/T$. This hysteresis effect occurred only in the first heating cycle; when the sample was heated and cooled the second time, the $\sigma(T)$ values plotted into the same straight line. Similar measurements were also made in weak vacuo and in free atmosphere; in the first case σ was found to increase less, in the second one it did not increase at all.

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Electrical conductivity of...

This indicates that the increase in σ is due to oxygen losses which depend on the O_2-pressure of the atmosphere. The radiation effect was studied with specimens previously subjected to several heating cycles in vacuo. An integral dose of 10^{18} neutrons/cm^{-2} led to a considerable increase in σ, especially at low temperatures. After neutron irradiation the straight lines $\log\sigma = f(1/T)$ showed a break at 150°C ($MgTiO_3$) and 180°C ($ZnTiO_3$). Irradiation also caused a change in activation energy: For $MgTiO_3$ before irradiation it was equal to 0.87 ev, after irradiation it was 0.42 ev below and 0.72 ev above 150°C. For $ZnTiO_3$ these values were: 0.87 ev, 0.62 ev and 0.95 ev. The increase in σ can be attributed to defect formation and ionization processes. Analogous results were obtained by B. L. Vul (FTT, 3, No. 8, 2264, 1961) and Kolomoytsev. V. S. Vavilov and Ye. A. Konorova are thanked for discussions. There are 2 figures and 3 Soviet references.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR Moskva
(Physics Institute imeni P. N. Lebedev AS USSR, Moscow)

SUBMITTED: July 10, 1961

Card 2/2

L 1723-66 EWT(m)/EPF(c)/EPF(n)-2/EWP(t)/EWP(b) IJP(c) JD/GG

ACCESSION NR: AP5022717 UR/0181/65/007/009/2749/2753

AUTHOR: Vodop'yanov, L. K.; Kurdiani, N. I.

TITLE: Electric properties of InSb irradiated with neutrons at 77K and electrons at 300K

SOURCE: Fizika tverdogo tela, v. 7, no. 9, 1965, 2749-2753

TOPIC TAGS: neutron irradiation, irradiation effect, electron radiation, semiconductor crystal

ABSTRACT: Specimens of n- and p-type InSb crystals were irradiated with neutrons at low temperatures and electrons at room temperature in a pulse reactor. Cd filters were used to prevent nuclear transformations which can occur when the substance interacts with slow neutrons. To detach 1-ev neutrons, which can be resonance-absorbed by indium and can produce transmutation impurities, an additional filter made of indium was applied. The specific resistance of the specimens was measured at 77K during irradiation. For p-type specimens the resistance increased with an increase in the integral irradiation dose and then, apparently because of a change of conductivity type, the resistance decreased, approaching saturation. For n-type specimens the resistance increased, also approaching saturation.

Card 1/1

L 1723-66

ACCESSION NR: AP5022717

The conductivity type did not change. During annealing the p-type specimens underwent inversion, the reverse of what occurred during irradiation. The annealing of n-type specimens consisted of two stages: from 77 to 150K and from 150 to 260K. For the first stage the activation energy of defects was 0.05 ev; for the second, 0.16 ev. After irradiation the dependence of $\Delta\rho/\rho_0$ on H (ρ being the specific resistance) did not change, although the absolute value of magnetoresistance increased. Thus, this increase was more substantial for p-type specimens than for n-type. Irradiation of InSb n- and p-type crystals with electrons was carried out at 300K. Electrical properties were measured at 77K. An electrostatic generator was the source of 1-Mev electrons. The electrical properties of p-type specimens were virtually unaffected by irradiation. The specific resistance of n-type specimens increased as the irradiation dose was increased. No inversion was observed. Radiation defects stable at 300K were not detected. The increase in magnetoresistance was not as strong as occurs during neutron irradiation, although it was observable and increased with the size of the irradiation dose. It is concluded that in a two-component InSb semiconductor, unlike an atomic semiconductor (e.g., Ge, Si), electron and neutron irradiation creates radiation defects which affect electrical properties in various ways. Orig. art. has: 4 figures and 1 table. [JA]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moscow (Physics Institute, AN SSSR)

Card 2/2

L 1723-66
ACCESSION NR: AP5022717

SUBMITTED: 01Feb65 ENCL: 00 SUB CODE: NP,SS

NO REF SOV: 001 OTHER: 008 ATD PRESS: 4095

Card 3/3

L 21551-66 EWT(1)/EWT(m)/EPF(n)-2/T/EWP(t)/EWA(h) IJP(c) JD
ACC NR: AP6003803 SOURCE CODE: UR/0181/66/008/001/0254/0256

AUTHOR: Vodop'yanov, L. K.; Kurdiani, N. I.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Optical absorption in gallium arsenide irradiated with large integrated fluxes of fast neutrons

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 254-256

TOPIC TAGS: semiconductor crystal, neutron irradiation, irradiation damage, irradiation effect

ABSTRACT: An investigation was made of changes in the properties of a GaAs semiconductor after strong irradiation with fast neutrons. The specimens used were of nonalloyed n-type GaAs, which before irradiation at 77K had a carrier concentration (n) of 2×10^{17} cm^{-3}, a specific resistance (ρ) of 9×10^{-3} ohm·cm, and a mobility (μ) of 3×10^{3} $cm^2 \cdot v^{-1} \cdot sec^{-1}$. The specimens were irradiated in the central channel of a nuclear reactor. After irradiation with large integral fluxes of fast neutrons, the two-component compound GaAs retained its fundamental semiconductor properties. Mobility and the concentration of current carriers, however, decreased. Measurements of the optical

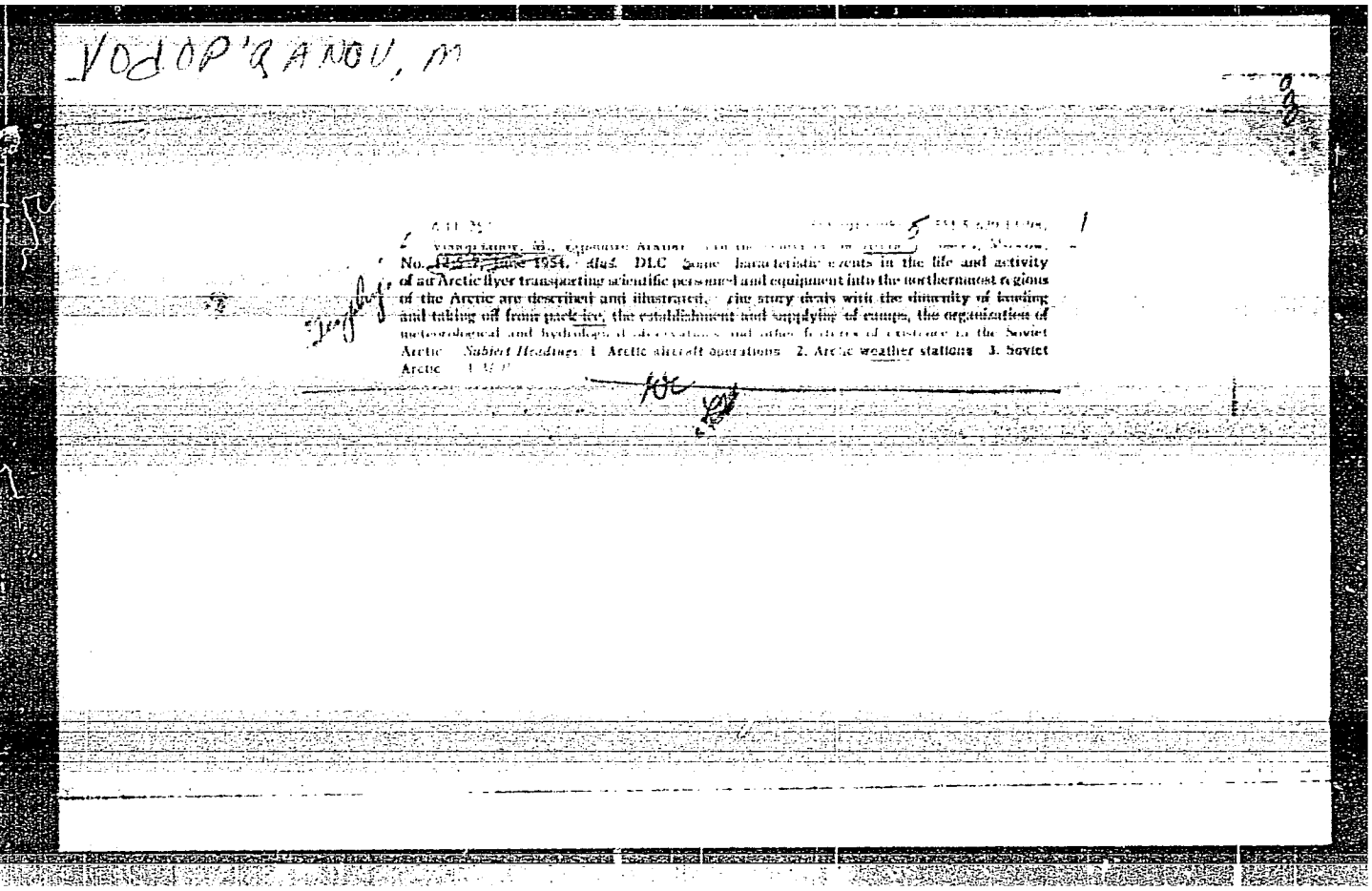
Card 1/2

L 21551-66
ACC NR: AP6003803 O

absorption showed that after strong irradiation the periodic crystalline lattice in GaAs specimens was preserved and that the general idea of the zone model was applicable. Such irradiation caused no remarkable change in the width of the forbidden zone. Orig. art. has: 1 figure. [JA]

SUB CODE: 20/ SUBM DATE: 27Jul65/ ORIG REF: 001/ OTH REF: 003
ATD PRESS: 4219

Card 2/2 BLG



VODOP'YANOV, M

No. [illegible], June 1954. 41p5. DLC Some characteristic events in the life and activity of an Arctic flyer transporting scientific personnel and equipment into the northernmost regions of the Arctic are described and illustrated. The story deals with the diversity of landing and taking off from pack ice, the establishment and supplying of camps, the organization of meteorological and hydrological observations and other features of existence in the Soviet Arctic. *Subject Headings*: 1. Arctic aircraft operations 2. Arctic weather stations 3. Soviet Arctic [illegible]

VODOP'YANOV, M., geroi Sovetskogo Soyuza.

First masters of flight ("Outstanding Russian aviators." G.V.Zalutskii. Reviewed by M.Vodop'ianov). Tekh.mol. 22 no.9:29 S '54. (MLRA 7:9)
(Air pilots) (Zalutskii, G.V.)

VODOP'IANOV, M.

Poliarnyi letchik (Polar flier). Moskva, Detgiz, 1952. 221 p.

SO: Monthly List of Russian Accessions, Vol. 6, No. 5, August 1953

VODOP'YANOV, M.

The Center of the Arctic, Smena, Moscow, No. 12, 1954, pp. 5-7

VODOP'YANOV, M.

VODOP'YANOV, M., geroy Sovetskogo Soyuza.

[Valerii Chkalov] Valerii Chkalov. [Moskva] Molodaia gvardiia, 1954. 286 p. (MLRA 7:7)
(Chkalov, Valerii, 1904-1938)

VODOP'IANOV, M.

AID P - 485

Subject : USSR/Aeronautics

Card 1/1 Pub. 58 - 14/15

Author : Georgiyev, V.

Title : New Book about Valeriy Chkalov

Periodical : Kryl. rod., 9, 22, S 1954

Abstract : The author reviews a book about Chkalov, famous Soviet flier, by Vodop'yanov, M.

Institution : None

Submitted : No date

SOV-4-58-9-21/34

AUTHOR: Vodop'yanov, M.V., Hero of the Soviet Union and Grigor'yev, G.K.

TITLE: Captive in the Ice (V ledovom plenu)

PERIODICAL: Znaniye-sila, 1958, Nr 9, pp 26-29 and p 1 of cover (USSR)

ABSTRACT: This is an excerpt from a book by M.V. Vodop'yanov and G.K. Grigor'yev "The Tale of the Commissar of the Arctic" describing the shipwreck of the Soviet arctic expeditionary ship "Chelyuskin" in 1934, and the rescue of the crew. The expedition was lead by the well-known artic explorer - Academician Otto Yul'yevich Shmidt, Hero of the Soviet Union. There are 11 drawings.

1. Literature--USSR

Card 1/1

Vodop'yanov, M.V.

VODOP'YANOV, Mikhail Vasil'yevich; ZUBKOVA, T.D., red.; LEVONEVSKAYA, L.G., tekhn.red.

[Winged heroes] Krylatye bogatyri. [Leningrad] Lenizdat, 1957. 194 p. (MIRA 11:5)
(Air pilots)

VODOP'YANOV, Mikhail Vasil'yevich, geroy Sovetskogo Soyuza; PROKHODTSEVA, S.Ya., red.; VILENSKAYA, E.N., tekhn.red.

[Paths of the courageous] Puti otvazhnykh. Moskva, Gos. izd-vo geogr. lit-ry, 1958. 117 p. (MIRA 11:5)
(Arctic regions)

VODOP'YANOV, M.V.

85-58-6-11/43

AUTHOR: Mal'ginov, N.

TITLE: Valuable Handbook (Tsennoye posobiye)

PERIODICAL: Kryl'ya rodiny, 1958, Nr 6, p 5 (USSR)

ABSTRACT: The author reviews three new books. The first, by N. K. Pyneyev entitled "Action of a Plane's Crew" When Compelled to Land in an Uninhabited Area" (Deystviya ekipazha samoleta vynuzhdenno-popavshego v bezlyudnuyu mestnost'), is published by Voyenizdat, 1957. The second, a pamphlet by D. Zyuzin and A. Markusha, entitled "Tu-104 in the Air" (V nebe Tu-104), published by Molodaya Gvardiya (Young Guard) Moscow, 1957, reviews briefly the development of Soviet aviation; the third new book is by M. V. Vodop'yanov, well known polar pilot, is entitled "In the Air and on the Ground" (V vozdukhe i na zemle), Khabarovsk, 1957.

1. Civil aviation--USSR 2. Books--Review

Card 1/1

VODOP'YANOV, M.V.

AID P - 1268

Subject : USSR/Aeronautics

Card 1/1 Pub. 58 - 12/15

Author : Not given

Title : New books

Periodical : Kryl. rod., 2, 17, F 1955

Abstract : Three books are briefly reviewed: 1. Vodop'yanov, M. V., On Wings in the Arctic; 2. Storchiyenko, P., From Higher Altitudes; 3. Vasil'chenko, M. and Yu. Khukhra, Line High Speed Model of the Type "Flying Wing" with a Jet Engine.

Institution : None

Submitted : No date

VODOP'YANOV, M.V.

[Flight to the Arctic] Na kryl'iakh v Arktiku. Moskva, Geografgiz, 1954. 344 p. (MLRA 7:11D)

VODOP'YANOV, M.V.

Put' Letchika (The way of the Aviator) Moskva, Geografgiz, 1953.
270 P. Illus., Ports.

SO: N/5
757
.V8

VODOPYANOV, M. (V., Maj Gen), Hero of the Soviet Union

Author of article, "On Wings to the Arctic," concerning Arctic flights and the present work and living conditions in the northern regions of the USSR. Izvestiya, Moscow, 18 Jul 54

SO: SUM 291, 2 Dec 1954

VODOP'YANOV, M.

Aeronautics, Commercial

Train over the clouds. Tekh. molod. 20 no. 5, 1952

Monthly List of Russian Accessions, Library of Congress, July 1952. Unclassified.

VODOP'YANOV, M. V.

Put'letchika [The career of a flyer]. Moskva, Geografgiz, 1953. 270 p.

SO: Monthly List of Russian Accessions, Vol. 6 No. 12 March 1954.

VODOP'YANOV, Mikhail Vasil'evich, 1899-

Twice at the pole. Moskva, Sovetskii pisatel', 1938. 262 p. map. (49-34748)

G630.R8V6

1. Ekspeditsiia SSSR na Severnyi polius, 1937. 2. North pole. 3. Arctic regions. 4. Aeronautics - Flights.

VODOP'IANOV, Mikhail Vasil'evich, 1899-

A flight to Franz Josef Land. Moskva, ONTI, Glavnaia redaktsiia nauchno-populiarnoi i iunosheskoi literatury, 1937. 178 p. (42-52010)

TL532.V56

VODOP'YANOV, Mikhail Vasil'yevich

"The Center of the Arctic"

Smena, Moscow, No. 12, June 1954.

VODOP'YANOV, Mikhail Vasil'yevich; PROKHODTSEVA, S.Ya., redaktor; RIVINA, I.N., tekhnicheskiy redaktor.

[By plane to the Arctic] Samolyotom v Arktiku. Moskva, Gos. izd-vo geograficheskoi lit-ry, 1954. 344 p. (MLRA 7:12)
(Arctic regions)

VORONIANOV, MIKHAIL VASIL'YEVICH

Na krylyakh v arktiki (On Wings to the Arctic) Moskva, Geografgiz, 1954.

343 p. illus., ports.

VODOP'YANOV, Mikhail Vasil'yevich, 1899- .

[The career of a flyer] Put' letchika. Moskva, Gos.izd-vo geogr. lit-ry, 1953. 270 p. (MLRA 7:2)
(Vodop'ianov, Mikhail Vasil'evich, 1899-)

VODOP'IANOV, MIKHAIL VASIL'EVICH

VODOP'IANOV, MIKHAIL VASIL'EVICH. ... Pelety. Leningrad, Glavsevmorputi, 1937. 591 p.

DLC: TL526.R9V6

SO: LC,Soviet Geography, Part I, 1951, Uncl.

VODOP'YANOV, Mikhail Vasil'yevich, 1899-

[The career of a flyer] Put' letchika. Moskva, Gos. izd-vo geogr. lit-ry, 1953. 270 p. (MLRA 7:2)
(Vodop'yanov, Mikhail Vasil'yevich, 1899-)

VODOP'YANOV, MIKHAYL VASIL'EVICH

Dvazhdy na poliuse. /Twice on the Pole/. Moskva, Sovetskii pisatel', 1938. 262 p. plates, ports., map.
CSt-H NN

Moscow-North pole-Vancouver, Wash. Moscow, Foreign languages publishing house, 1939. 39 p. incl. plates, ports.
NN

Ot sokhi k samoletu., /From plough to airplane/. Moskva, Izdatel'stvo TSK VLKSM, Molodaia gvardiia, 1937. 251 p. illus.
NN DLC: TL540.V6A3

Outstanding flights by Soviet airmen. Moscow, Foreign Languages Publishing House, 1939, 30 p. (In Russia (1923 -USSR) Komissar Sovetskoi chasti Mezhdunarodnoi vystavki v N'iu Iorke, 1939. USSR no. /57/.
IEN

SO: Soviet Transportation and Communications, A Bibliography, Library of Congress Reference Department, Washington, 1952, Unclassified

1. VODOP'YANOV, M. V.

2. USSR (600)

4. Ushakov, G. A.

7. Book about Soviet explorers of the Arctic ("Across untrodden land." G. A. Ushakov. Reviewed by M. V. Vodop'yanov). Tekh.molod. 20 no. 12, 1952

9. Monthly List of Russian Accessions, Library of Congress, March 1953, Unclassified.

VODOP'YANOV, M. V.

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 252 - 1

BOOK Call No.: AF602978

Author: VODOP'YANOV, M. V.
Full Title: THE PATH OF A PILOT
Transliterated Title: Put' Letchika

Publishing Data
Originating Agency: Ministry of Culture, USSR Publishing Office
Publishing House: State Publishing House of Geographic Literature
Date: 1953 No. pp.: 272 No. of copies: 50,000
Editorial Staff
Editor: None Tech. Ed.: None
Editor-in-Chief: None Appraiser: None

Text Data
Coverage: This is a biography and a description of achievements of Vodop'yanov, an arctic long range flier and explorer. The account of his expedition to the North Pole in 1936-1937 makes up the main part of the book (Chapter III). In connection with this expedition, only Y-2 and P-5 aircraft are mentioned. During the war Vodop'yanov flew heavy bombers in combat operations. After the war he returned again to arctic flying.

This is a narrative without concrete technical data. Topographical

and climatological description are vague, and no information about aviation materiel appears in the text.

Purpose: Propaganda for aviation and popularization of science.

Facilities: A large number of names connected with arctic flying appear in the text.

No. of Russian and Slavic References: None

Available: A.I.D., Library of Congress.

VODOP'YANOV, Mikhail Vasil'yevich, Geroy Sovetskogo Soyuza; GODINER, P.Ye., red.; SORKIN, M.Z., tekhn. red.

[Pilot Chkalov] Letchik Chkalov. Moskva, Izd-vo DOSAAF, 1963. 196 p. (MIRA 16:12)
(Chkalov, Valerii Pavlovich, 1904-1938)

VODOP'YANOV, O.V.; LABZ, A.D.

Electric power economy in capping work using hydraulic wash methods. Prom. energ. 12 no.3:24-25 Mr '57. (MLRA 10:4)
(Hydraulic mining)

VODOP'IANOV, MIKHAIL VASIL'EVICH.

Rasskaz o moei zhizni. Izd. 2. Moskva, Sovetskii pisatel', 1937. 156 p., port.
Title tr.: The story of my life.

T1540.V6A35 1937

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

VODOP'IANOV, MIKHAIL VASIL'EVICH.

Mechta pilota. Izd. 2. Moskva, Molodaia gvardiia, 1937. 166 p., port.

Title tr.: The dream of a pilot.

TL721.V6A3 1937

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

VODOP'IANOV, MIKHAIL VASIL'EVICH.

Polet na zemliu Frantsa Iosifa; pod redaktsiei nach. Poliarnoi aviatsii Glavsevmorputi, geroia Sovetskogo soiuza M. I. Sheveleva. Moskva, Glav. red. nauchno-popul. i iunosh. lit-ry, 1937. 178 p., illus., port.

Title tr.: The flight to Franz Josef Land.

TL532.V56

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

VODOP'IANOV, MIKHAIL VASIL'EVICH.

Ot sokhi k samoletu. Moskva, Molodaia gvardiia, 1937. 251 p., illus.

Title tr.: From the plow to the airplane.

TL540.V6A3

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.